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THE IMPACT OF NEW INCENTIVE SCHEMES ON REGIONAL COMPETITIVENESS AND COMPARATIVE ADVANTAGE OF EAST AND WEST COAST PADDY PRODUCTION IN PENINSULAR MALAYSIA

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ABSTRACT

The food security is a very vital issue in the world and closely related to the rice industry in Malaysia. In 2008, Malaysia and other countries worldwide suffered a devastating food crisis because rice exporting countries experienced widespread natural disasters caused by flooding that destroyed paddy fields. Such incidents demonstrated the importance of enhancing food security seriously. To tackle this issue, Malaysian government had taken drastic action to boost the country's rice production through a new incentive scheme. The objectives of this study were to assess the private and economic profitability of four major granary areas in the East and West coast of Peninsular Malaysia in 2012/2013 production season using a Policy Analysis Matrix (PAM). Based on the analysis, Muda Agricultural Development Authority (MADA) recorded the highest private profit while Ketara Integrated Agriculture Development Area (IADA KETARA) recorded the highest economic profit. Analysis of comparative advantage based on Domestic Resource Cost (DRC) and Social Cost Benefit (SCB) indicators showed that all areas have comparative advantage and IADA KETARA recorded the highest value. The results also showed clearly that the DRC values were higher after the new paddy incentives.

Key words: New incentives, competitiveness, comparative advantage, paddy

INTRODUCTION

The food security issue in Malaysia is not a new issue. Food security is defined as the ability of a country to provide food in sufficient quantities at affordable prices for its population. In Malaysia, there is no specific policy regarding food security. Though, food security can be measured by the level of self-sufficiency of a particular food product. For example, rice (*Oryza sativa*) is the staple food for majority of Malaysian. If rice were not available at a reasonable price to Malaysians then Malaysia would be said to be food insecure. Currently, Malaysia imported 30% of total rice consumption every year because the domestic rice production only meets 70% of the total rice requirement. As noted by Alam (2011) Malaysia had never met a food self-sufficiency level and because of that rice was imported from neighbouring countries such as Thailand, Vietnam, Myanmar, India and Pakistan. The highest food self-sufficiency level for the country was recorded in 1975 with 95% SSL and the lowest one was 65%, which was recorded in 1990.

Essentially, the amount of rice imported is slightly higher, which leads to questions such as whether rice-producing countries will continue to supply rice at affordable prices if these countries are hit by production problems such as natural disasters. In the event of food crisis 2008, producer countries cannot supply enough rice to the world due to shortfall in rice production (Fatimah *et al.,* 2010). Since that crisis, the government has taken proactive steps to improve the country's rice production by introducing numbers of new subsidy schemes and incentives. The National Key Economic area

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(NKEA) plays an important role in achieving the National Agro Food Policy to achieve targets such as improved national self-sufficiency level, enhancing national food security to enable us to reduce our dependence on agriculture imports (MOA, 2011).

The objective of this study was to assess the profitability and also the comparative advantage of paddy farming in major granary areas of Peninsular Malaysia. To achieve the objective, this research has applied Policy Analysis Matrix (PAM) as an instrument to measure the profitability and comparative advantage. By using PAM, the results will assist policymakers in addressing the central issues of agricultural policy (Monke and Pearson, 1989).

MATERIALS AND METHODS

Study area and data sampling

The study used primary data. The data was obtained through a cross-sectional survey conducted to collect farm level data for the 2013 cropping season using structured questionnaire. Two-stage sampling technique was employed in this study which are four granary areas were purposively selected. The selected granaries were Muda Agricultural Development Authority (MADA), Kemubu Agricultural Development Authority (KADA), KETARA Integrated Agriculture Development Area (IADA Penang) and Penang Integrated Agriculture Development Area (IADA KETARA). The second stage involved random sampling of paddy farmers from a list of paddy farmers in each of the granaries through the aid of agricultural officers. Totally, 200 farmers involved as respondent in MADA, 124 respondents in KADA, 48 respondents in IADA KETARA and 47 respondents involved in IADA Penang. In the context of this study, the in-depth interview is suitable to obtain the detailed cost of paddy production. The questions covered few aspects of output, input, and some major socio-economic characteristics.

Theoretical framework of policy analysis matrix (PAM)

The PAM is basically a double-accounting technique that actually summarises budgetary information for farm and post farm activities (Kanaka, 2013). In a PAM model, four categories in the farm budget must be determined. First is revenue, second is cost of tradable inputs, third category is cost of domestic factors and profits with the profits being the difference between the revenue and the last category is total input costs (Ogbe *et al.,* 2011). The disaggregation of input into two categories, which is tradable and non-tradable, is another important component of the analysis. Fertilizers, seeds, fungicides, pesticides, insecticides, herbicides were included in tradable inputs whilst the non-tradable inputs include irrigation fees, land, labour, tractor and sprayer service, capital and simple farm tools, and implements.

Referring to the Table 1, the Policy Analysis Matrix contains three rows and four columns representing the budget for an activity. The first row of the matrix covers private prices. This captures production costs and revenues stated in terms of the market prices faced by the farmer. Therefore, in private prices, to calculate the profits expressed in the term of market prices, we can do it by subtracting the two cost categories (B and C) from revenues (A). The second row of the PAM presents the costs and revenue of farmers under a situation in which farmers are facing the prices that would appear due to a lack of government policies or market failures. In the third row of the PAM, divergences captured are actually the differences between the private budget and the social budget that covers the critical information about the level of price distortion due to various policies (Liverpool *et al.,* 2009).

RESULTS AND DISCUSSION

Socioeconomic characteristics of the respondents

Based on Table 2, for the entire results on the participation of farmers, KADA and IADA Penang have shown the highest percentage of male farmers with 98%. Similarly, MADA also recorded the participation of male farmers about 94% compared to female farmer with only 6%. The participation of female farmers can be seen higher in IADA KETARA compared to other three granary areas that is 12.5% or six out of 48 farmers. The results also noted that the Malays dominate the paddy planting activities in each granary as 100% of the farmers at MADA, KADA and IADA KETARA are Malays and only 2% or only one Chinese farmer is involved in the paddy

Table 1. Standard format of PAM

	Revenue	Tradable Input Cost	Domestic Factor Cost	Profit
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Divergences	I	J	K	L

Source: Monke and Pearson (1989)
Notes:
Private profits: D = A – (B+C) Input transfers: J = B – F
Social profits: H = E – (F+G) Factor transfers: K = C – G
Output transfers: I = A–E Net transfers: L = I – J – K

Table 2. Socio-economic characteristic of paddy farmer

		Percentage (%)			
	Factor	MADA	KADA	IADA Penang	IADA Ketara
Gender	Male	93.5	98	98	87.5
	Female	6.5	2	2	12.5
Race	Malay	100	100	98	100
	Chinese	0	0	2	0
	Indian	0	0	0	0
Age	20–29	1.5	4	6	4
	30–39	5	14	6	17
	40–49	19.5	26	19	17
	50–59	34	34	13	38
	60–69	32	19	45	23
	70–79	8	3	11	2
Education	No formal education	2.5	12	2	21
	Primary school	30	18	38	44
	Secondary school	65	56	51	33
	Higher education	2.5	15	9	2
Marital status	Single	2	6	2	6
	Married	98	94	98	92
	Widow/er	0	0	0	2
Household size	1 to 3 people	28	23	47	29
	4 to 6 people	52.5	51	43	42
	7 to 9 people	16.5	22	6	23
	more than 10 people	3	4	4	6
Experience in paddy production	1 to 10 years	13.5	33	26	27
	11 to 20 years	25	29	32	31
	21 to 30 years	32.5	26	26	25
	31 to 40 years	15.5	7	11	8
	41 to 50 years	11	4	4	8
	51 to 60 years	2.5	1	2	0
Training/ conference/course attended in last 3 years	yes	44.5	48	91	33
	no	55.5	52	9	67
Land ownership	Own	20.5	1	9	21
	Rent	30.5	64	68	48
	Own and rent	49	35	23	31

Source: field survey

planting activities at the IADA Penang. The analysis of farmers' age had shown that the highest percentage belongs to the age which ranges from 50-59 which majority of the farmers are in KADA, MADA and IADA KETARA. MADA and KADA have recorded 34% and 38% of the total respondents respectively. For IADA Penang, it was recorded that the highest percentage is 45% or 21 farmers out of 47 respondents are in the age range of 60-69. This data recognized the farmers' condition in each granary area were old farmers, lack of energy and health deteriorating and needed help from other people to continue their effort on farming. Coelli *et al*. (2002) found that young paddy farmers in Bangladesh are more efficient than older farmers.

Most of the farmers in each granary area have completed secondary school as revealed in MADA with 65%, IADA Penang 51% and KADA 56%. However, IADA KETARA is noted to have the highest percentage in terms of education level at primary school with 44%. This number clearly emphasised that the level of farmer's education is at a medium level. Based on the opinion of Joshi, (2001) benefit from higher education will only be noticed when it has been applied in modern agricultural sector as compared to the traditional agricultural sector.

Referred to Table 2, it is noted that most of the farmers in the study area are married. There are only 2% of the farmers in MADA and IADA Penang who are still single. For KADA, it is recorded that 96% of the farmers are married and the same also goes for IADA KETARA, which recorded 94%. Married farmers are expected to be more committed in producing paddy because they have family members to take care of and the family members can also help them in planting paddy. For the family size, three out of four granary areas have recorded

a higher percentage for a household of four to six people. MADA has recorded 52.2%, KADA 51% and IADA KETARA 42%. For IADA Penang, the highest percentage are from household of one to three people which is 47% followed by household of four to six people with 43%. Mailena *et al.* (2014) stated that three factors that significantly affected the rice farm efficiency were household size, land ownership and secondary level of education of sampled farmers. The farmers with more households are seen managing their production more efficient.

In the four granary areas studied, it is noted that the farmers have planted the paddy in two kinds of land ownership. It is either in their own land or it was on rented land. It is noted that in MADA, 49% of the farmers planting the paddy in both types of land ownership. IADA Penang, KADA and IADA KETARA showed a higher percentage of farmers leasing other people's land that is 68%, 64% and 48% respectively. The results also showed that in these four granary areas, the number of farmers that used their own land to plant paddy is very low, for example in KADA only 1% of the farmers used their own land to plant the paddy. The analysis also showed that all of the farmers have experience in planting paddy. For MADA, a higher percentage has been recorded for those with 21 to 30 years of experience, which is 32.5%. For IADA Penang and IADA KETARA, those with 11 to 20 years experience showed a higher percentage, which is 32%. However, for KADA, the highest percentage for length of experience recorded the shortest length of experience which one to 10 years at 33%. In terms of attending training, class or seminar, 55.8% of MADA's farmer has been recorded as not having attended any training, class or seminar. Compared to IADA Penang, most of the farmers have attended training, seminar or class with the percentage of farmers attended at 91%. KADA and IADA KETARA also have a higher percentage of farmers not attending any training, seminar or class, which is 52% for KADA and 67% for IADA KETARA.

Analysis of private profitability

The financial and economic profitability in this section have been derived from the PAM table in Table 3. The private profitability of paddy production was measured by subtracting the total costs (tradable input and domestic) from the revenue. The result indicated that all the granary areas have a positive private profitability and MADA demonstrated the highest profitability with RM676.01 per hectare followed by IADA KETARA with RM646.53 per hectare while KADA showed the lowest result with profitability of only RM223.85 per hectare. Based on Table 3, IADA Penang showed the highest private revenue. However, the tradable input cost and domestic cost are high, causing the low private profitability. It should also be noted that IADA KETARA has the lowest cost of tradable cost input and non-tradable input. Social profit is a measurement of efficiency and, if it is positive, demonstrates that scarce resources are being used efficiently by the industry in question thereby contributing to national income. For every granary area studied, there were positive value of social profitability and KETARA indicated the highest value with RM747.80 per hectare followed by KADA with RM744.28 per hectare. Next was MADA with RM663.064 per hectare. IADA Penang, with only RM529.29 per hectare, reported the lowest profitability. This social profit shows that the farm is profitable and has a comparative advantage. This also means that all the granary areas can survive without government intervention and the resources are fully utilised by allowing efficient production. Even though the result showed that the paddy production is profitable at both private and social prices, the net profit transfer or divergences indicated otherwise.

Table 3. Policy analysis matrix of four granary area in Peninsular Malaysia

Granary	Price	Revenue/ha	Costs/ha		Profit/ha
			Tradable inputs	Domestic factor	
KADA	Private	859.12	145.84	489.43	223.85
	Social	1343	127.19	471.52	744.28
	Divergences	-483.88	18.65	17.91	-520.43
KETARA	Private	1260.31	189.15	424.63	646.53
	Social	1343	165.07	430.13	747.8
	Divergences	-82.69	24.08	-5.50	-101.27
MADA	Private	1348.52	145.2	527.32	676.01
	Social	1343	126.71	553.23	663.06
	Divergences	5.52	18.49	-25.92	12.95
IADA PENANG	Private	1401.73	217.65	630.55	553.53
	Social	1343	189.82	623.89	529.29
	Divergences	58.73	27.83	6.66	24.24

For the four granary areas involved in this study, KADA and IADA KETARA showed negative divergences while MADA and IADA Penang showed positive values. KADA presented – RM483.88 per hectare while KETARA presented – RM82.69 per hectare. IADA Penang presented the highest value of net profit transfer, which is RM58.73 per hectare compared to MADA with only RM5.52 per hectare even though the value is still positive. This result demonstrated that for KADA and IADA KETARA, higher prices of output can be offered to farmers if the crop is linked to international market so that it could be better marketed. For tradable inputs, all of the study areas had positive divergences. Such positive divergences indicated a tax on inputs. The highest tradable input was noted by IADA Penang, which is RM27.83 per hectare followed by KETARA with RM24.08 per hectare, and then KADA with RM18.65 per hectare. The lowest was noted by MADA with RM18.49 per hectare. Table 3 also showed that KADA and KETARA have a negative divergence at – RM520.43 per hectare and – RM101.27 per hectare, respectively. It means that the effect of the policies was to tax the paddy farm. These results showed that KADA and KETARA do not require any protection or subsidy to yield substantial profit. The negative divergence showed that paddy production in that area was being taxed probably through the low selling price of paddy. IADA Penang showed the highest positive divergence at RM24.24 per hectare.

Analysis of comparative advantage

Table 4 presents the Domestic Resource Cost (DRC) and Social Cost Benefit (SCB) value for the granary areas investigated. The DRC value for every area was below one indicating that the paddies in all areas have a comparative advantage and the use of domestic factor is socially profitable. IADA KETARA has the lowest value of DRC, which is 0.37, followed by KADA with 0.39. Next was MADA with 0.46 while the highest was IADA Penang with 0.54. This result also indicated that IADA KETARA has the highest comparative advantage and IADA Penang has the lowest comparative advantage. The interpretation of this value is that for every RM1 of paddy produced in IADA KETARA, KADA, MADA and IADA Penang, RM0.37, RM0.39, RM0.46 and RM0.54 were used, respectively, for domestic resources. This means that the farmers can earn or save RM0.63, RM0.61, RM0.54 and RM0.46 of foreign exchange from paddy production in different granary area.

The average DRC of four granary areas is RM0.44 that reflects that farmers can earn or save RM1 of foreign exchange by employing the domestic resources of RM0.44 in paddy production. It also implies that a paddy has a comparative advantage, as this product can generate foreign exchange at a lower resource cost than the direct purchase of foreign exchange. Quddus *et al.* (2011) in the study of comparative advantage of major crop production in Punjab noted that the DRC value for Basmati rice from 1999 to 2005 was less than one. This means that through Basmati rice exports, the domestic resources involved in earning USD 1 were consistently less than the corresponding exchange rate. The rankings derived from DRC values are supported by the fact that identical rankings were also obtained by using the SCB values. The SCB was supposed to provide more accurate rankings of the comparative advantage of alternative activities (Masters & Nelson, 1995; and Ismail & Radam, 1994). Based on these results, it can be claimed that the paddy in the four areas that were involved in this study were effectively produced.

Government incentive impact on paddy production before and after 2008

Table 5 presents a comparison of the comparative advantage for IADA Penang, IADA KETARA and KADA. MADA was not included in the table because the research conducted in 2007 and 2009 does not involved MADA. The table showed clearly that the DRC value for three of the granary areas were high in year 2009 and 2012 compared to year 2007. The differences are huge, as the example shown by IADA KETARA, in year 2007, the DRC value is above 1 but after 2008, the DRC value had decreased to 0.33 in 2009 and 0.37 in 2012. It means that before 2008, IADA KETARA did not have any comparative advantage, but after the new incentives were introduced, IADA KETARA has managed to produce at quite a high comparative advantage. This result indicated that the incentive introduced after 2008 had gave positive impact on paddy production in every granary area investigated and should be continued in the future.

Table 4. Domestic Resource Cost Ratio (DRC) and the Social Cost Benefit (SCB) for four granary area

	KADA	KETARA	MADA	IADA PENANG	Mean
DRC	0.388	0.365	0.455	0.541	0.44
SCB	0.446	0.443	0.506	0.606	0.5

Table 5. Comparative advantage of selected granary area in 2007, 2009 and 2012

Year	KADA	IADA PENANG	KETARA
	DRC		
2007	0.94	0.61	1.26
2009	0.43	0.47	0.33
2012	0.39	0.54	0.37
	SCB		
2007	0.95	0.66	1.21
2009	0.52	0.56	0.42
2012	0.45	0.61	0.44

CONCLUSION

The results showed that all the granary areas have a positive value of private and social profitability and MADA was placed first in the rank for private profitability while IADA KETARA ranked first for social profitability. The result indicated that all the granary areas are profitable and could survive even without government intervention. KADA and IADA KETARA presented a negative value of divergence. This means that these areas were being taxed perhaps through the low selling price of paddy. The study on comparative advantage showed that all the granary areas studied have a comparative advantage based on DRC and SCB values, which are less than one. The IADA KETARA recorded the best value of DRC and SCB followed by KADA, MADA and finally by IADA Penang. When comparing the DRC and SCB before and after the food crisis occurred, it was found that the values of DRC and SCB have increased. This means that the rice industry's new incentive scheme introduced in 2008 has been effective in improving the comparative advantage of the country's rice industry.

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